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④ 手術顎微鏡

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㉗ 引用文献

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㉘ 実用新案登録請求の範囲

共通の対物レンズを有し、該レンズの後方に左右一対の第 1 の立体視観察光学系を配した立体顎微鏡において、

前記共通の対物レンズの後方で且つ又、前記第 1 の立体視観察光学系の左右の光軸を含む面と略直交する面内に、左右一対の光軸を含む第 2 の立体視観察光学系を配すると共に、前記第 1 及び第 2 の立体視観察光学系内の少くとも一方に左右の光軸を同一方向へ屈曲せしめる全反射部材を配したこととを特徴とする立体視観察方向を異にした手術顎微鏡。

考案の詳細な説明

本考案は手術顎微鏡に助手用顎微鏡を手術顎微鏡の対物レンズを共通に用いて一体に構成することにより術者と助手が常に患者の同一点を観察できるように成し、手術における助手の術者に対する補助をより確実に且つ迅速に行なわれるための手術顎微鏡に関する。

手術顎微鏡下での手術時における姿勢は普通、患者を仰臥させ、術者は患者の頭側に位置する。

この時、助手は患者の脇側に位置するわけである。助手は、術者を補助するため絶えず患者の手術部を観察する必要がある。

第 1 図は従来の手術顎微鏡と助手用顎微鏡を示す。1 は対物レンズで、2 はズームレンズ系で、3 は結像レンズで、4 は反射鏡で、5 は接眼レンズである。以上により術者用顎微鏡光学系 a を構成しており、手術部 o を立体視可能な如く 2 つの光学系より成っている。b は、手術用顎微鏡光学系 a より適当な角度だけ傾斜した位置に設けられた助手用顎微鏡光学系で、対物レンズ 1'、結像レンズ 3'、接眼レンズ 5' より構成されている。尚、この助手用顎微鏡光学系 b も手術部 o を立体視可能な如く 2 つの光学系より成っている(第 1 図参照)。このような構成による手術顎微鏡においては、前述した如く助手は術者の脇側に位置しなければならない。そして、術者は、自分の視野をさえぎらないように手術を行なうため助手用顎微鏡の視野が術者の手によりさえぎられ、患者の手術部が助手には見えにくいという欠点がある。これは、助手が術者を補助する意味からも、また緊急の事態に素早く処置するためにも重大な問題となつている。また術者が助手の視野を妨げないような方法をとり手術の自由度をなくすといふことも生じている。さらに、術者用顎微鏡と助手用顎微鏡との観察角度が異なるため、視野が異なるという欠点もある。

また、前者の欠点を解決するために提案された手術顎微鏡に、術者及び助手が患者の両脇に位置し、差し向いの方式にて使用するものがあるが、例えば、眼科手術などの場合、右眼も左眼も同じように手術するため、また術者と助手が近くに位置するためにも好ましいものとはいえない。

本考案の目的は、以上の各欠点を取除くために術者用顎微鏡光学系の対物レンズを共通に用い助手用顎微鏡光学系を構成した手術顎微鏡を提供することにある。

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以下、本考案についての一実施例を添付第2図に基づき詳細に説明する。

第2図に於いて、¹は、対物レンズ¹上に術者頭微鏡光学系^aのズームレンズ系²とほぼ直角方向に配設されている反射鏡で、^{3'}は該反射鏡⁴からの光を結像せしめる結像レンズで、⁵は接眼レンズである。このような構成による助手用頭微鏡光学系^bは、同図ハに示すように患者の手術部を立体視可能な如くするため、2つ設けられている。この実施例においては術者用頭微鏡のみがズーム系に形成されているが、第3図に示すように助手用頭微鏡にもズーム系^{2'}を組入れ、術者頭微鏡のズーム系²と連動せしめてズーミングしてもよい。

かくの如き構成であるから、患者の手術部^oより出た光は対物レンズを通過し一部は術者用頭微鏡光学系に入り、一部は助手用頭微鏡光学系の反射鏡⁴あるいはズームレンズ系^{2'}に入射する。そして、各光学系の結像レンズ³, ^{3'}によって結像された手術部^oは接眼レンズ⁵, ^{5'}により観察できる。

第4図に本考案の他の実施例を示す。第4図は、助手用頭微鏡光学系^bと術者用頭微鏡光学系^aの対物レンズ¹を共通に用いるだけでなく、立体視するための光学系も共通に用いるもので、以下説明すると、⁶は術者用頭微鏡光学系^aの一方の結像レンズ³と反射鏡⁴の間に配設したハーフミラーで、この反射方向には接眼レンズ⁵が設けられている。即ち、この光学系は、術者用頭微鏡光学系と助手用頭微鏡光学系を兼ねている。⁷は、術者用頭微鏡光学系の他方の結像レンズと反射鏡との間に配設された濃度板で、その透過率は前記ハ

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ーフミラー⁶の透過率と等しく形成されている。この濃度板⁷は助手用頭微鏡光学系^bにも配設されている。

以上の構成により患者の手術部^oより出た光は、⁵対物レンズ¹に入り、ズームレンズ系², ^{2'}及び結像レンズ³を通過し、術者用頭微鏡光学系の一方に配設したハーフミラーに入射し、透過光と反射光とに分離される。透過光は術者用頭微鏡光学系^aの接眼レンズ⁵に反射光は助手用頭微鏡光学系^bの接眼レンズ^{5'}に入射する。

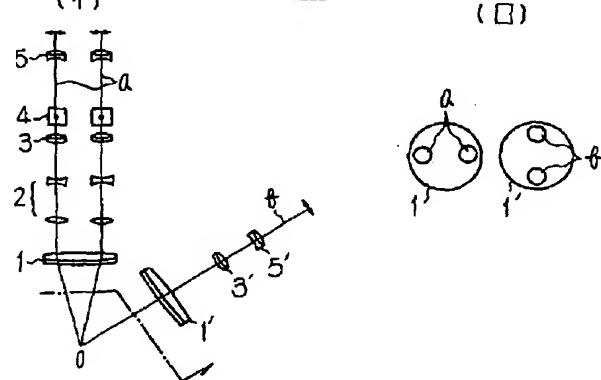
以上述べた本考案によれば、装置全体をコンパクトに出来ると共に立体視角も同一に出来像の見え具合を損うこともない。又従来の手術頭微鏡において、これまで問題となつていた助手用頭微鏡での観察が、術者の手によつてさえぎられるという欠点が除かれ大きな利点となる。また、助手用頭微鏡での観察視野が、術者の視野と同じになり、不断の観察、素早い処置が可能となり術者を補助する役目を大いに果たすことになる。

図面の簡単な説明

第1図イは従来の手術頭微鏡の光学系を示す図で、同図ロは矢視図である。第2図及び第3図イ、ロは本考案における手術頭微鏡の光学系の一実施例図で、ハは下面図である。第4図イ、ロは本考案における手術頭微鏡の光学系の他の実施例を示す図でハは下面図である。

主要部分の番号の説明。1, 1'…対物レンズ、
2, 2'…ズームレンズ系、3, 3'…結像レンズ、
4, 4'…反射鏡、5, 5'…接眼レンズ、6, 6'…
30 ハーフミラー、7, 7'…濃度板。

オ 1 図

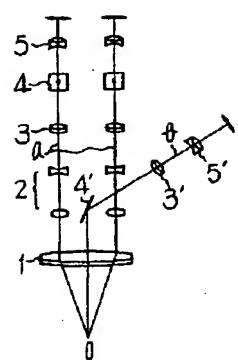


(3)

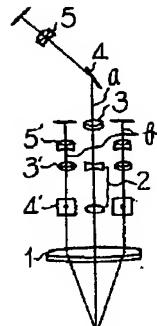
実公 昭55-39364

第2図

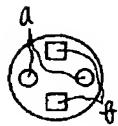
(1)



(2)

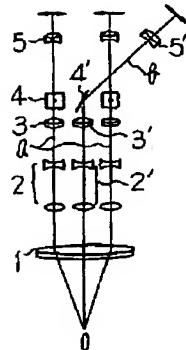


(3)

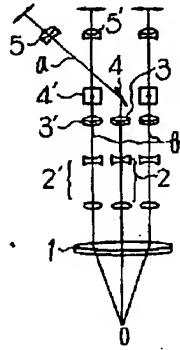


第3図

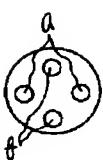
(1)



(2)

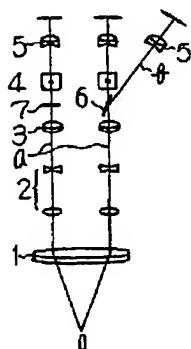


(3)

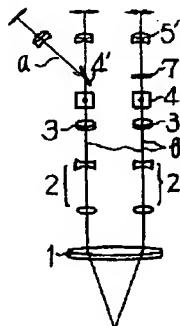


第4図

(1)



(2)



(3)



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(12) Published Examined Utility Model (Y12) (24) (44) Publication Date September 13, 1980
(51) Int. Cl.⁸ Identification Code In-House Reference. No.
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(56) Referenced Documents

Japan Laid-Open Patent Publication 51-78352 (JP, A)

Scope of Utility Model Claims

A stereoscopic microscope comprising a common objective lens arranges a left and right pair of a first stereoscopic microscope optical system behind said lens,

A surgical microscope comprises:

behind a common objective lens, a second stereoscopic microscope optical system that includes a left and right pair of optical systems arranged in a plane that nearly orthogonally crosses with a plane that includes left and right optical axes of a first stereoscopic microscope optical system, and a full reflecting member causes curvature to the same direction in at least one of the left and right luminous fluxes within the first and second stereoscopic microscope optical systems.

Description of the Idea

The present idea relates to a surgical microscope for performing more accurate and prompt support to a surgeon by an assistant in an operation and is composed to enable the surgeon and the assistant to be able to observe the same point on a patient by constituting an assistant microscope as a single unit into a surgical microscope by incorporating a common objective lens from the surgical microscope.

The circumstances occurring at the time of surgery under a surgical microscope are normally that patients are laid down facing up and the surgeon is positioned at the head of the patient. At this time, the assistant is positioned at the side of the patient. The assistant must be able to observe the surgical area of the patient continually in order to assist the surgeon.

Fig. 1 shows the surgical microscope and assistant surgical microscope of the prior art. Numeral 1 is the objective lens, 2 is the zoom lens system, 3 is the image formation lens, 4 is the reflecting mirror, and 5 is the eyepiece lens. The above constitutes the surgical microscope optical system, and it is comprised of two optical systems to enable a three dimensional view of the surgical area (o). The reference indicator (b) is the assistant microscope optical system installed in a position that is tilted to an appropriate angle from the surgeon microscope (a), and it is comprised of an objective lens 1', an image formation lens 3', and an eyepiece lens 5'. Moreover, this assistant microscope (b) is also comprised of two optical systems to enable a three dimensional view of the surgical area (o) (see Fig. 1 for reference). The assistant must be positioned at the side of the patient with a surgical microscope with this type of constitution. Furthermore, in order for the surgeon to operate without blocking his own field of view, he must operate so his hands interfere with the field of view of the assistant microscope and this is a weakness in that the assistant cannot view the surgical area of the patient. This is a serious problem when considering an assistant supporting a surgeon for immediate treatments in critical situations. Furthermore, a surgeon can attempt to not interfere with the assistant's field of view but this results in a loss of freedom for the surgeon. In addition, since the angle of observation differs for the surgical microscope and the assistant microscope, the field of view also differs and this is a problem.

In order to resolve the problems described above, the surgeon and the assistant can position themselves on both sides of the patient and can use by facing each other. However, in the case of eye surgery or so forth, since the right eye and the left eye are operated on identically, it is not necessarily best for the surgeon and the assistant to be positioned close to each other.

The purpose of the present idea is to provide a surgical microscope comprising an assistant microscope optical system using a common objective lens with a surgeon microscope that avoids the aforementioned problems.

A description of one Embodiment relating to the present idea will be given in detail hereafter with reference to Fig. 2.

In Fig. 2, the reference numeral 4' is a reflecting mirror that is arranged in nearly an orthogonal direction with the zoom lens system 2 of a surgeon microscope optical system (a) above the objective lens 1. The reference numeral 3' is an image formation lens that causes image formation of a light from the reflecting mirror 4'. The reference numeral 5' is the eyepiece lens. According to this type of construction, there are two assistant microscope optical systems (b) installed so as to enable a three dimensional view of the surgical area of the patient as shown in (iii) of the same Drawing. With the present Embodiment, only the surgeon microscope installs a zooming system, however, as is shown in Fig. 3, the assistant

microscope can also install a zooming system 2', and it may zoom in conjunction with the zooming system 2 of the surgeon microscope.

According to the above construction, the light that exits from the surgical area (o) of the patient transmits through the objective lens and a portion of the light enters into the surgeon microscope, and a portion of it enters into the zooming lens system 2' of the reflecting mirror 4' of the assistant microscope optical system. Furthermore, the surgical area (o) imaged by the image formation lenses 3 and 3' of each of the optical systems can be observed by the eyepiece lenses 5 and 5'.

Another example of the present idea will be shown according to Fig. 4. Fig. 4 not only uses a common objective lens 1 between the assistant microscope (b) and the surgeon microscope (a) but also uses a common optical system for a three dimensional view, and as will be described below, the reference numeral 6 is a half mirror arranged between the image formation lens 3 and the reflecting mirror 4 of one side of the surgeon microscope, and an eyepiece lens 5' is arranged in the reflecting direction thereof. In other words, with this optical system, the surgeon microscope optical system overlaps with the assistant microscope optical system. The reference numeral 7 is a density plate arranged between the other image formation lens and reflecting mirror of the surgeon microscope optical system, and the transmission index thereof is formed so as to be equal to the transmission index of the half mirror 6. The density plate 7 is also arranged as 7' in the assistant microscope optical system.

According to this construction, the light that exits from the surgical area (o) of the patient enters the objective lens and is transmitted through the zooming lens systems 2 and 2' as well as the image formation lens 3', and it enters into the half mirror arranged in one of the surgeon microscope optical systems and is split into a transmission beam and a reflection beam. The transmission beam enters in the eyepiece lens of the surgeon microscope optical system (a) and the reflection beam enters into the eyepiece lens of the assistant microscope optical system (b).

According to the present idea described above, it is possible to achieve an overall compact device without losing the ability to see the same three dimensional image that is made. Further, the ability to resolve the problem with the surgical microscope of the prior art where observation with the assistant microscope having certain problems such as the surgeon's hand blocking the view is a significant benefit. Also, the observation field of view with the assistant microscope is the same as the field of view as that of the surgeon making it possible for the role of assisting a surgeon to be more effective in emergency treatments with constant observation.

Brief Description of the Drawings

Fig. 1 (i) is a drawing showing the optical system of a surgical microscope of the prior art.

Fig. 1 (ii) is a cross view drawing.

Fig. 2 and Fig. 3 (i) and (ii) are one example of the optical system of a surgical microscope that relates to the present idea. (iii) is a bottom view drawing.

Fig. 4 (i) and (ii) are another example of the optical system of a surgical microscope that relates to the present idea. (iii) is a bottom view drawing.

Description of the Reference Numerals

1, 1'	Objective lens
2, 2'	zooming lens system
3, 3'	Image formation lens
4, 4'	Reflecting mirror
5, 5'	Eyepiece lens
6, 6'	Half mirror
7, 7'	Density plate